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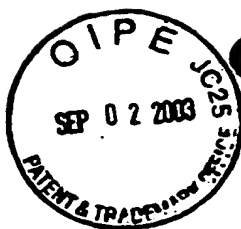
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This is to certify that the annexed is a true copy of the following application as filed with this office.

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Applicant(s) : ASAHI GOMU KAKO CO., LTD.

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List of Filing Evidence

(Name of Evidence)	Specification	1
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(Name of Evidence)	Abstract	1
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Necessity of Proof	Necessitated
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Specification

【Title of the Invention】 CUSHION STRUCTURE

【Claims】

1. A cushion structure comprising an elastic quadrilateral frame body, a hard quadrilateral frame body embedded in the elastic quadrilateral frame body, and a quadrilateral net stretched on the elastic quadrilateral frame body in a condition where each side end portion of the net is rolled up on the elastic quadrilateral frame body and fastened to the hard quadrilateral frame body.

2. A cushion structure as set forth in Claim 1, wherein a mounting plate adhered to each side end portion of the quadrilateral net is fastened to the hard quadrilateral frame body in such a manner that the quadrilateral net is stretched over the elastic quadrilateral frame body in a strained condition.

3. A cushion structure as set forth in Claim 1 or 2, wherein the cushion structure is in the form of a seat cushion or a backrest of a seat.

4. A cushion structure as set forth in Claim 1 or 2, wherein the cushion structure is in the form of a cushion frame of a seat cushion or a backrest of a seat.

【Detailed description of the Invention】

【0001】

【Field of the Invention】

The present invention relates to a cushion structure used as a seat cushion or backrest of various seats or a seat frame of the seat cushion or backrest.

【0002】

【Prior Art】

In Japanese Patent Laid-open Publication No. 11-290153, there has been proposed a cushion structure composed of a quadrilateral frame body and a quadrilateral net stretched over the frame body in a condition wherein each side end portion of the net is rolled up on the frame body and fastened to the frame body.

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【0003】

In the cushion structure, a metallic rigid frame is used as the quadrilateral frame body, and the cushion property of the structure is effected by the resiliency of the net. Accordingly, in comparison with a conventional cushion structure composed of a spring structure and a bottom plate mounted on a rigid frame body, the cushion structure is superior in elastic cushion property in a simple construction without causing a hardness feeling and a bottomed feeling.

【0004】

【Problems to be solved】

In the cushion structure, the cushion property of the structure is, however, influenced in dependence upon only the resiliency of the stretched net since the quadrilateral net is stretched over the frame body in a condition wherein each side end portion of the net has been rolled up on the frame body and is fastened to the frame body. It is also difficult to uniformly stretch the net in entirety. For this reason, there will occur a locally different portion in cushion property.

【0005】

Accordingly, an object of the present invention is to provide a cushion structure superior in cushion property without any locally different portion in cushion property.

【0006】

【Means for solving the problems】

According to the present invention, there is provided a cushion structure composed of a quadrilateral elastic frame body, a quadrilateral rigid frame body embedded in the elastic frame body, and a quadrilateral net stretched over the elastic frame body in a condition where each side end of the net is rolled up on the elastic frame body and fastened to the rigid frame body.

【0007】

In the cushion structure, a mounting plate adhered to each side end portion of the quadrilateral net is fastened to the rigid frame body to stretch the net over the elastic frame body.

【0008】

The cushion structure can be used as a seat cushion or a backrest of a passenger seat or a cushion frame of the seat cushion or the backrest.

[0009]

[Useful effect of the Invention]

In the cushion structure according to the present invention, a frame of combined structure composed of the elastic frame body and the rigid frame body embedded in the elastic frame body is provided, and each side end portion of the quadrilateral net is rolled up on the elastic frame body and fastened to the rigid frame body. With such a construction, the cushion property of the cushion structure is effected by the resiliency of the net and the resiliency of the elastic frame body. Thus, in comparison with a conventional cushion structure of this kind, the cushion structure according to the present invention is superior in cushion property and elastic feeling.

[0010]

In the cushion structure according to the present invention, each side end of the quadrilateral net is fastened to the rigid frame body through the elastic frame body. With such a construction, the elastic frame body acts to eliminate a local difference in tension of the net thereby to uniformly stretch the net in entirety. Thus, the cushion structure can be provided without any local difference in cushion property.

[0011]

[Preferred Embodiment]

Illustrated in Figs. 1 and 2 of the drawings is a preferred embodiment of a cushion structure in accordance with the present invention. Fig. 1 is a partly broken perspective view illustrating a bottom of the cushion structure 10, and Fig. 2 is a plan view illustrating the bottom of the cushion structure 10. In this embodiment, a quadrilateral frame 10a of combined structure composed of an elastic quadrilateral frame body 11 made of sponge and a rigid quadrilateral frame body 12 of metal, and a quadrilateral net 13 made of ultra-strong polyester threads woven in meshes.

[0012]

As shown in Figs. 1, 2 and 13, 14, the elastic frame body 11 is formed in a circular cross-section in a condition where it has been assembled in the cushion structure 10. Before assembled in the cushion structure 10, the elastic frame body 11 is formed semi-oval in cross-section as shown in Fig. 12. As shown in Figs. 1 and 3,

the rigid quadrilateral frame body 12 is in the form of a quadrilateral frame of L-letter shape in cross-section and is integrally embedded in the elastic frame body 11 and exposed in a condition where a flat portion 12b of the frame is maintained in contact with a flat portion of the elastic frame body 11.

【0013】

As shown in Figs. 1, 2 and 4, the net 13 is in the form of a quadrilateral net secured at each side end portion thereof to a mounting plate 14. The mounting plates 14 are adhered to each side end portion of the net 13 by means of an adhesive agent of thermoplastic resin. For adhesion of the mounting plate 14, an amount of polyester synthetic resin powder is heated at about 260 °C and brought into contact with the mounting plate 14. In a condition where the resin powder is maintained in a melted condition, the mounting plate 14 is placed on each side end portion of the net 13, and the melted resin powder is hardened by cooling under pressure. Thus, the mounting plate 14 is firmly adhered to each end portion of the net 13.

【0014】

The net 13 adhered to the respective mounting plates 14 is rolled up at each side end portion thereof on each frame portion, and the mounting plates 14 are fixed to the flat portion 12b of rigid frame body 12 by means of bolts 15 in a condition where the net 13 is maintained in its rolled up position. In such a condition, each frame portion 11a of the elastic frame body 11 is compressed by each side end portion of square net 13 and formed in a circular cross-section. Thus, the net 13 is stretched on the frame 10a of combined structure composed of the elastic frame body 11 and rigid frame body 12 and retained in place with a desired tension.

【0015】

In the cushion structure 10, the net 13 is placed at the upper surface of the frame 10a of combined structure in a condition where each side end portion of the net 13 was rolled up on each frame portion 11a of the elastic frame body 11 and fixed to the flat portion 12b of rigid frame body 12 at the bottom surface of the frame 10a. With such a construction, the resiliency of elastic frame body 11 is added to the resiliency of net 13 to enhance the cushion property of the structure 10. Thus, in comparison with a conventional cushion structure of this kind, the cushion structure becomes superior in cushion property and elasticity.

[0016]

As in the cushion structure 10, each side end portion of net 13 is fixed to the flat portion 12b of rigid frame body 12 through each frame portion 11a of elastic frame body 11, the elastic frame body 11 is useful to eliminate a local difference in tension of the net 13 and to retain the entirety of net 13 in a uniformly stretched condition. This is useful to provide the cushion structure 10 without causing any local difference in cushion property.

[0017]

Accordingly, the cushion structure 10 can be adapted as a seat cushion or backrest of a passenger seat or as a cushion frame of the seat cushion or backrest. The cushion structure 10 can be manufactured by manufacturing steps shown in Figs. 11 to 14 in use of a manufacturing apparatus 20 shown in Figs. 5, 6 and 10.

[0018]

The manufacturing apparatus 20 is composed of an outer support bed 21, an inner pressure bed 22 disposed in the support bed 21, a plurality of clamping mechanisms 23, and a plurality of pressure mechanisms 24. The clamping mechanisms 23 are in the form of eight sets of clamping mechanism arranged respectively in a pair and opposed to each other respectively at the left and right sides of support bed 21 and at the front side and backside of outer support bed 21. The pressure mechanisms 24 are arranged at each corner of the support bed 21 and opposed to one another.

[0019]

As shown in Figs. 6 to 9, the clamping mechanisms 23 each are composed of a support bracket 23a, a clamping lever 23b, an operation lever 23c and a connecting arm 23d. The clamping lever 23b is pivotally mounted at its rear end portion on a front portion of support bracket 23a for rotary movement in a vertical direction. The operation lever 23c is pivotally connected at its front end to the rear end portion of clamping lever 23b for rotary movement in a vertical direction. The connecting arm 23d is pivotally mounted at its rear end on a rear end portion of support bracket 23a for rotary movement in a vertical direction and pivotally connected at its front end to an intermediate portion of operation lever 23c for rotary movement in a vertical direction. The support bracket 23a is mounted on the support bed 21 to place the clamping mechanism 23 in position.

[0020]

When the clamping mechanism 23 is in an inoperative condition, the operation lever 23c is retained in an upward position as shown in Fig. 7 to retain the clamping lever 23b in an upward position. When the operation lever 23c is moved downward to rotate in a clockwise direction, the clamping lever 23b is rotated in a counterclockwise direction and retained in a horizontal condition to be pressed on the inner support bed 22 as shown in Figs. 8 and 9.

[0021]

As shown in Fig. 6, the pressure mechanisms 24 each are substantially the same in construction as the clamping mechanism 23. Namely, the pressure mechanisms 24 each are composed of a support bracket 24a, a pressure lever 24b, an operation lever 24c and a connecting arm 24d. When the operation lever 24c is moved downward, the pressure lever 24b is rotated in a clockwise direction and retained in a horizontal condition to be pressed inside the inner support bed 22.

[0022]

Illustrated in Figs. 11 to 14 is a manufacturing process of the cushion structure 10. In Fig. 10, there is illustrated an inoperative condition of the manufacturing apparatus 20. The manufacturing process of the cushion structure 10 is carried out by the steps of retaining the square net 13 on the inner support bed 22 in a flat condition as shown in Fig. 11, putting the quadrilateral frame 10a of combined structure on the net 13 supported on the inner support bed 22 as shown in Fig. 12, pressing the frame 10a of combined structure to roll up each side end portion of the net 13 on each frame portion 11a of the elastic frame body 11 as shown in Fig. 13, and fastening each side end portion of the rolled up net 13 to the flat portion 12b of the rigid frame body 12 as shown in Fig. 14.

[0023]

In the manufacturing process of the cushion structure, a rubber plate 23e for prevention of slippage is attached to each distal end of the clamping lever 23b as shown in Fig. 6, and the manufacturing apparatus 20 is set in an inoperative condition as shown in Fig. 10.

[0024]

At the first step of the manufacturing process, the net 13 is placed on the inner support bed 22, and each operation lever 23c of the clamping mechanisms 23 is operated to bring the rubber plate 23e attached to the clamping lever 23b into contact with each mounting plate 14 on the net 13. Thus, the net 13 is clamped by the clamping lever 23b at eight portions thereof on the inner support bed 22 and retained on the support bed 22 in a flat condition as shown in Fig. 11.

【0025】

At the second step of the manufacturing process, the frame composed of the elastic frame body 11 and rigid frame body 12 is placed in position on the net 13 horizontally supported on the inner support bed 22. At the third step of the manufacturing process, the operation levers 24b of pressure mechanisms 24 are operated to bring the pressure levers 24b into contact with the flat portion 12b of the rigid frame body 12 and to press the frame 10a downward against the net 13. Thus, each frame portion 11a of the frame 11 is compressed into circular in cross-section, and the net 13 is rolled up at each side end portion thereof on the frame 11 and stretched with a predetermined tension. In such operation of the pressure mechanisms 24, it is desirable to mutually operate the pressure mechanisms 24 opposed to each other.

【0026】

At the fourth step of the manufacturing process, the operation levers 23b of clamping mechanisms 23 are successively released from the stretched net 13, and the mounting plate 14 is placed in position on the flat portion 12b of rigid frame body 12 at the released portion of the stretched net 13 and fixed to the rigid frame body 12 by bolts 15. In this instance, it is desirable to release the clamping mechanisms 23 opposed to each other thereby to successively fasten the mounting plate 14 to the rigid frame body 12 at the released end portion of the stretched net 13.

【0027】

With the manufacturing process described above, the cushion structure 10 is manufactured with the net 13 stretched with a predetermined tension on the elastic frame body 11. In the cushion structure, the resiliency of elastic frame body 11 is added to the resiliency of net 13 to enhance the cushion property of the cushion structure 10 superior in elasticity without causing any local difference in the cushion property.

【Brief description of the drawings】

Fig. 1 is a partly broken perspective view illustrating a bottom of a cushion structure in accordance with the present invention;

Fig. 2 is a plan view illustrating the bottom of the cushion structure;

Fig. 3 is a partly broken perspective view of a rigid frame body used for the cushion structure;

Fig. 4 is a perspective view of a net used for the cushion structure seen from the front surface ;

Fig. 5 is a plan view of a manufacturing apparatus of the cushion structure;

Fig. 6 is a sectional view taken along line 6 – 6 in Fig. 5;

Fig. 7 is a side view of a clamping mechanism in an inoperative condition of the manufacturing apparatus;

Fig. 8 is a side view of the clamping mechanism in an operated condition;

Fig. 9 is a plan view of the clamping mechanism in an operated condition;

Fig. 10 is a schematic illustration of the manufacturing apparatus in a condition immediately before used for manufacturing the cushion structure;

Fig. 11 is a schematic illustration of an operated condition of the manufacturing apparatus at a first step for manufacturing the cushion structure;

Fig. 12 is a schematic illustration of an operated condition of the manufacturing apparatus at a second step for manufacturing the cushion structure;

Fig. 13 is a schematic illustration of an operated condition of the manufacturing apparatus at a third step for manufacturing the cushion structure; and

Fig. 14 is a schematic illustration of an operated condition of the manufacturing apparatus at a fourth step for manufacturing the cushion structure.

【Description of Reference numerals】

10...Cushion structure, 11...Elastic frame body, 11a...Frame portion, 12...Rigid frame body, 12a...Upright portion, 12b...Flat portion, 13...Net, 14...Mounting plate, 15...Bolt, 20...Manufacturing apparatus, 21...Support bed, 22...Pressure bed, 23...Clamping mechanism, 23a...Support bracket, 23b...Clamping lever, 23c...Operation lever, 23d...Connecting arm, 24...Pressure mechanism, 24a...Support bracket, 24b...Pressure lever, 24c...Operation lever, 24d...Connecting arm, 24e...Rubber plate.

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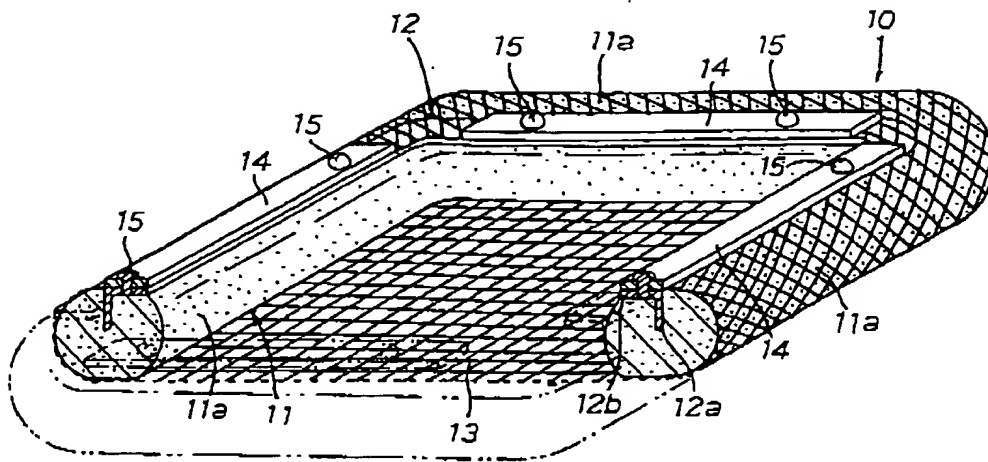


ABSTRACT OF THE DISCLOSURE

A cushion structure used as a seat cushion or backrest of a seat, which is composed of a square net stretched on a square frame of combined structure composed of an elastic square frame body and a hard square frame body embedded in the elastic square frame body, wherein each side end portion of the square net is rolled up on the elastic square frame body of the square frame and fastened to the hard square frame body of the square frame.



Fig.1



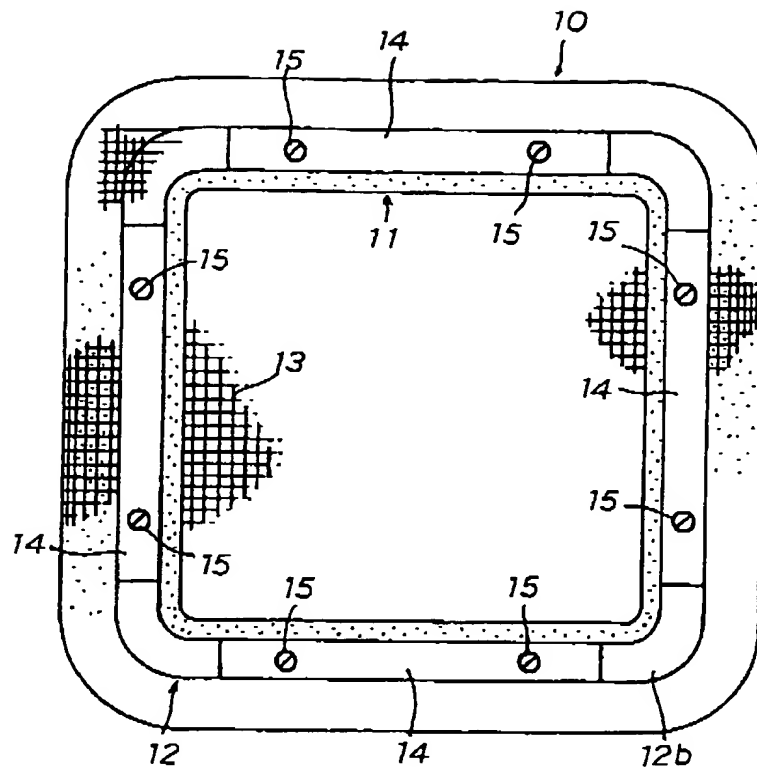




Fig.3

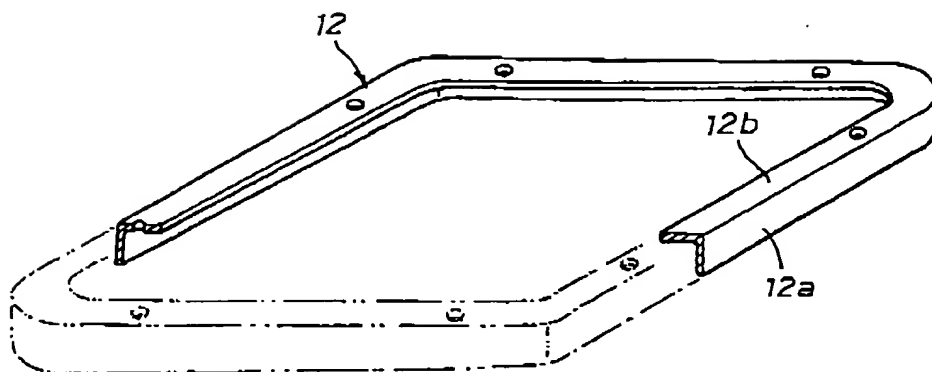


Fig.4

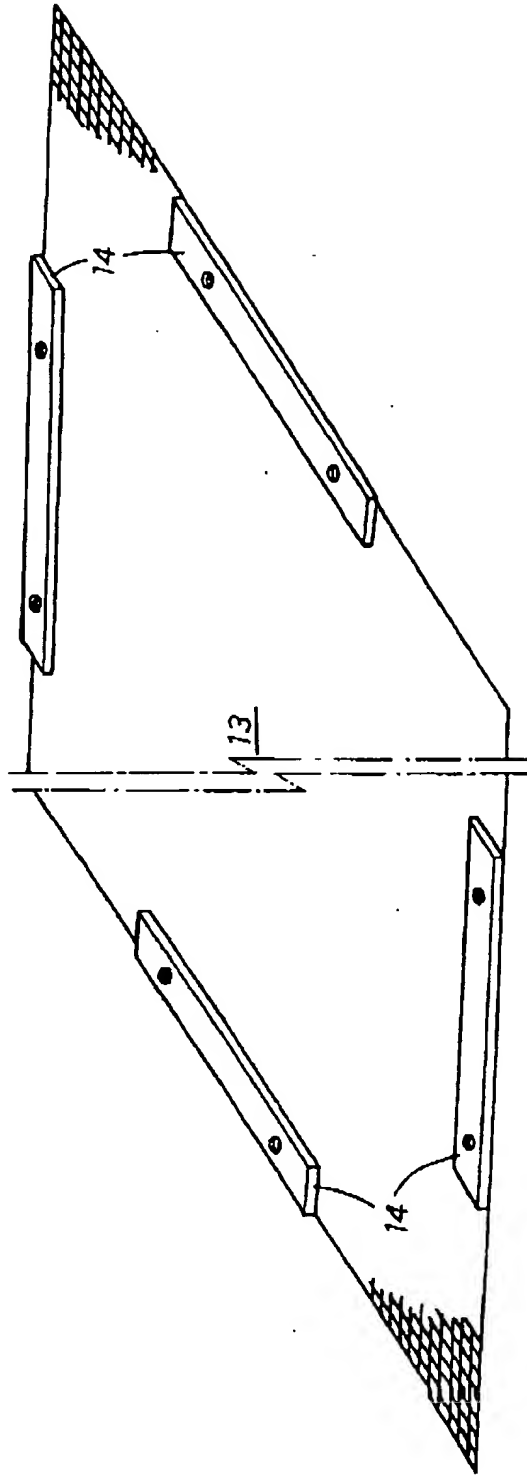




Fig.5

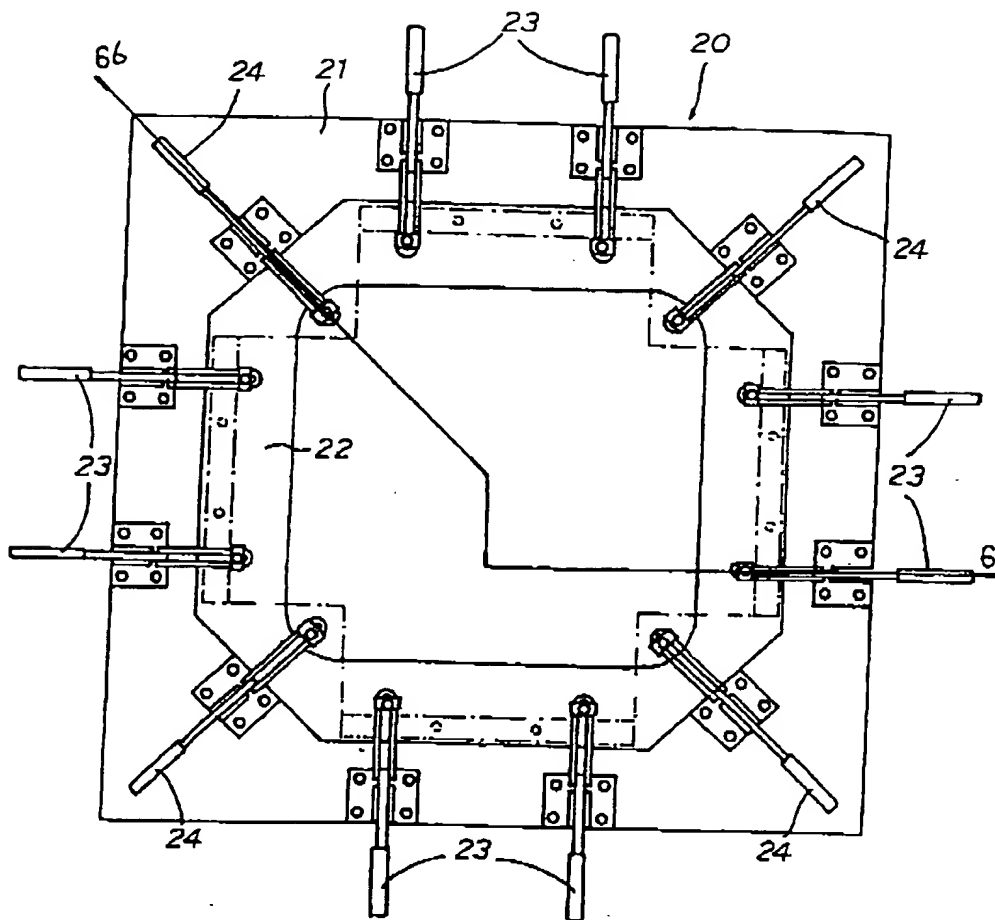




Fig.6

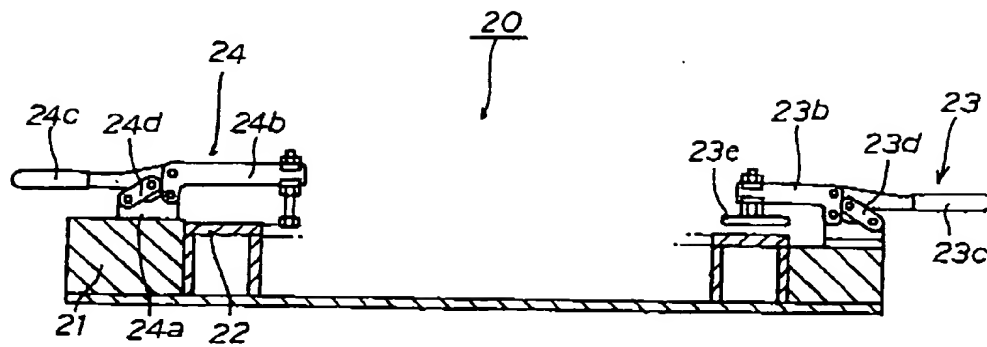


Fig.7

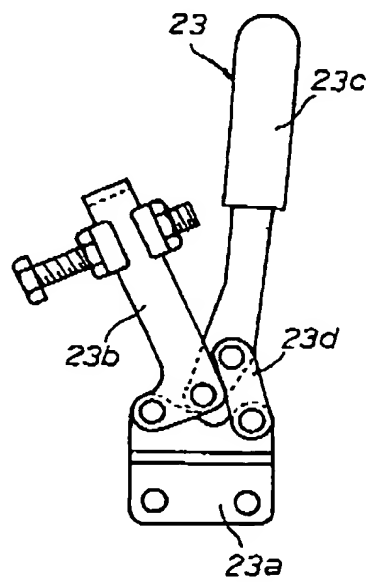




Fig. 8

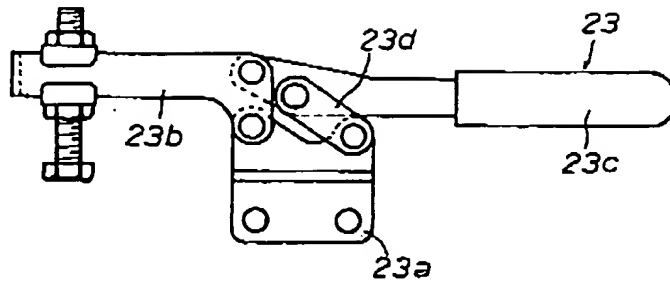


Fig. 9

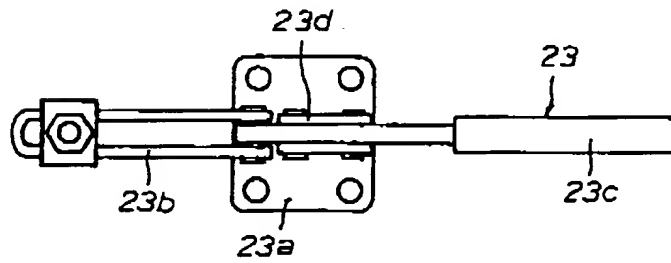


Fig.10

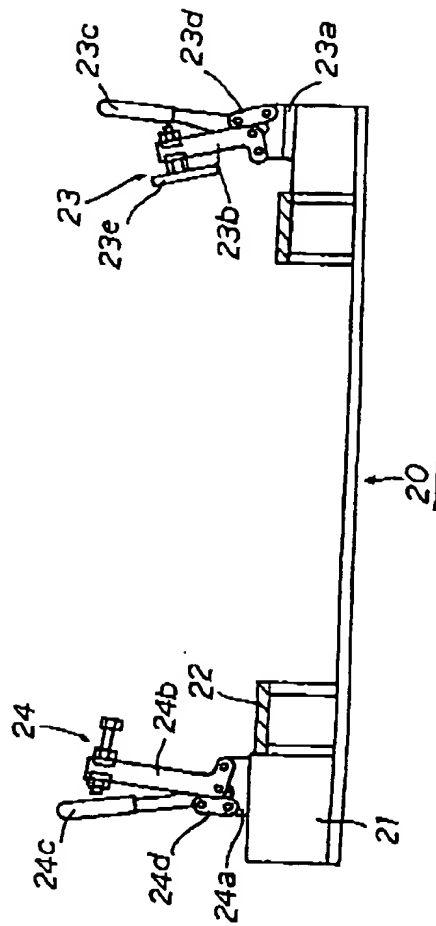




Fig. 11

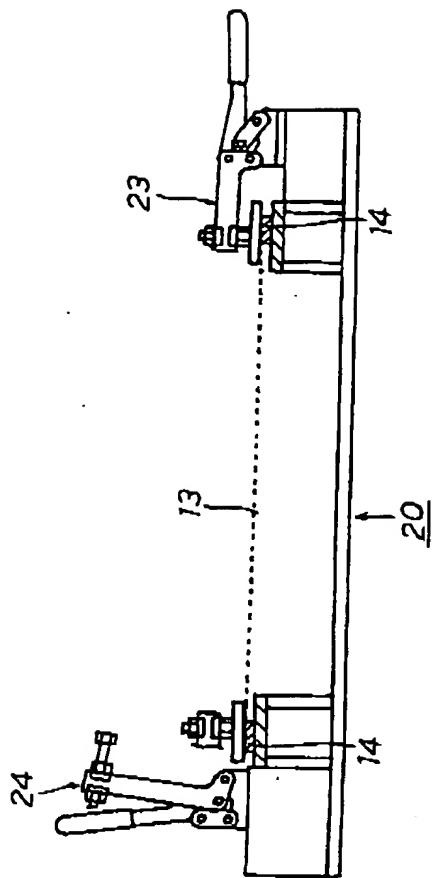




Fig.12

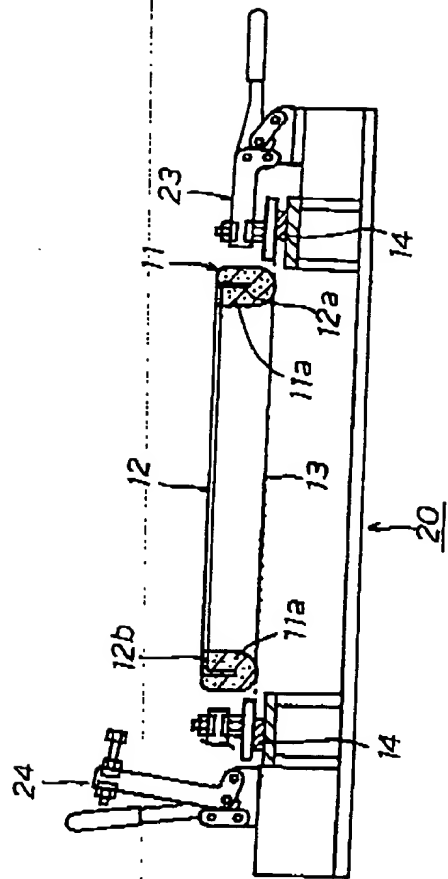




Fig.13

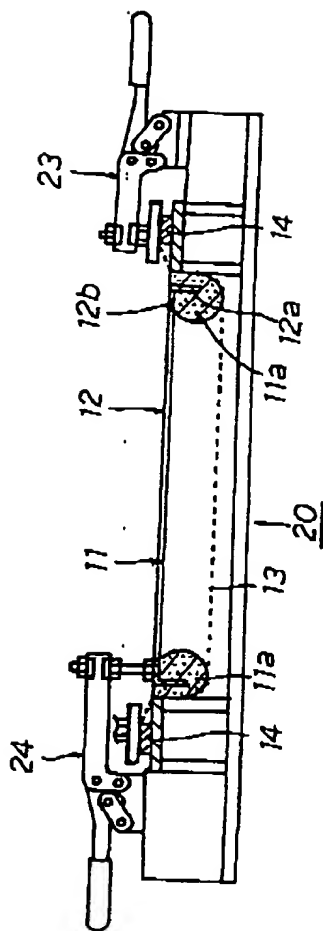
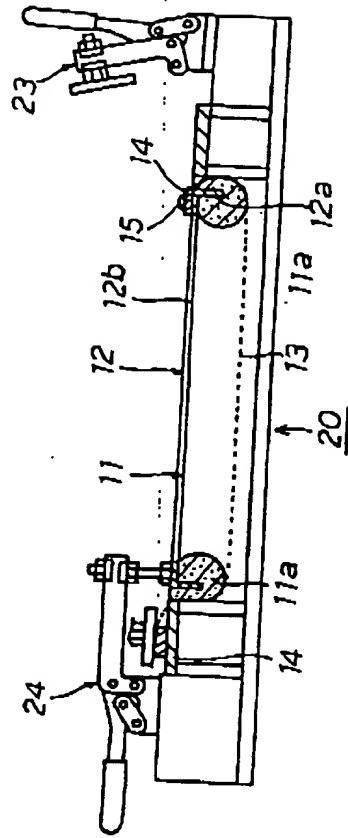




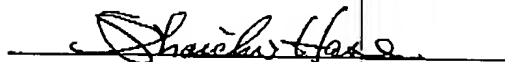
Fig. 14





CERTIFICATION

I, Shoichi Hase, of 35-9, Motohama-cho, Gifu-shi, Gifu-ken, 500-8007 Japan, hereby certify that I am the translator of the accompanying certified official copy of the document in respect of an application for a patent filed in Japan on the 28th December, 1999 and of the official certificate attached thereto, and certify that the following is a true and correct translation thereof to the best of my knowledge and belief.


Shoichi HASE

Dated this 2 September, 2003